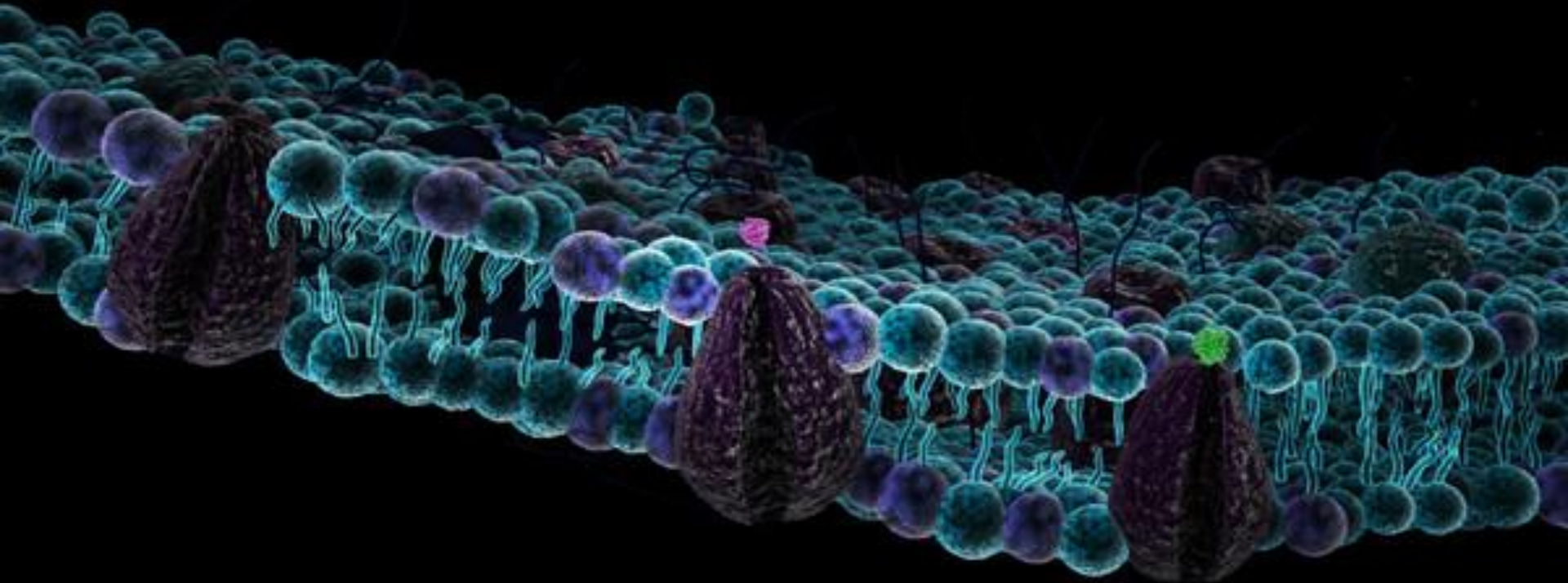


Cell Membrane

Part 1

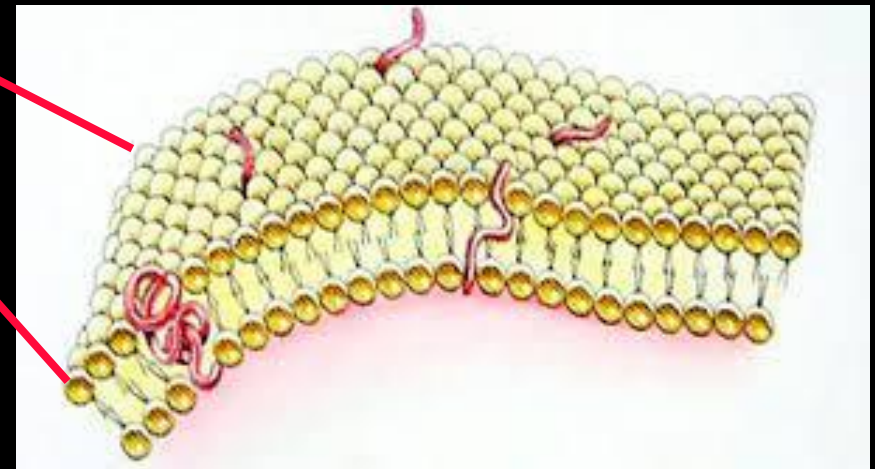
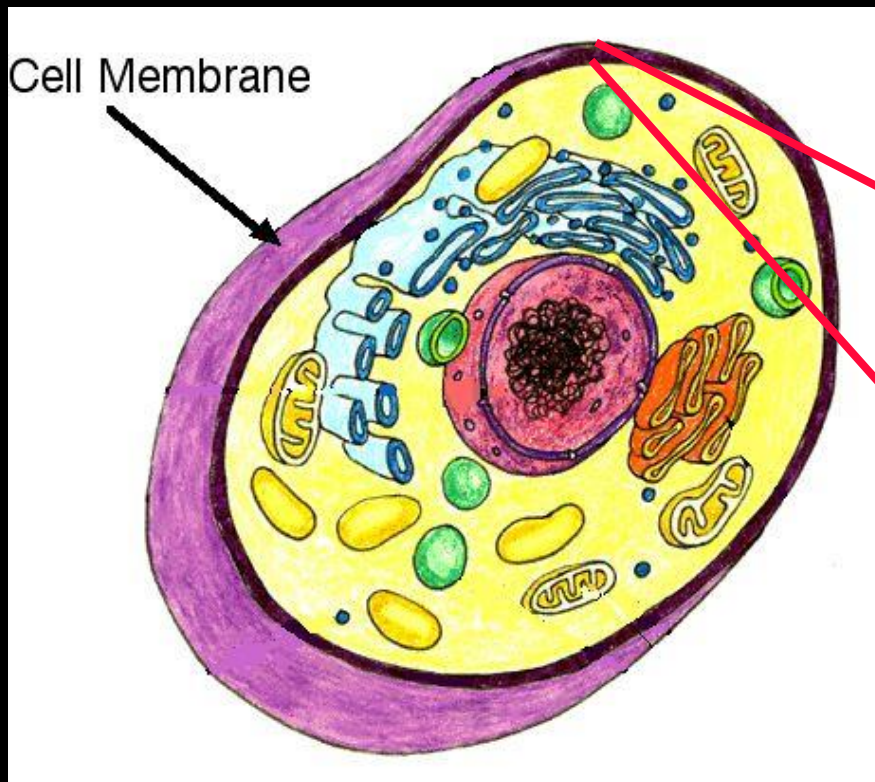


Learning Objectives

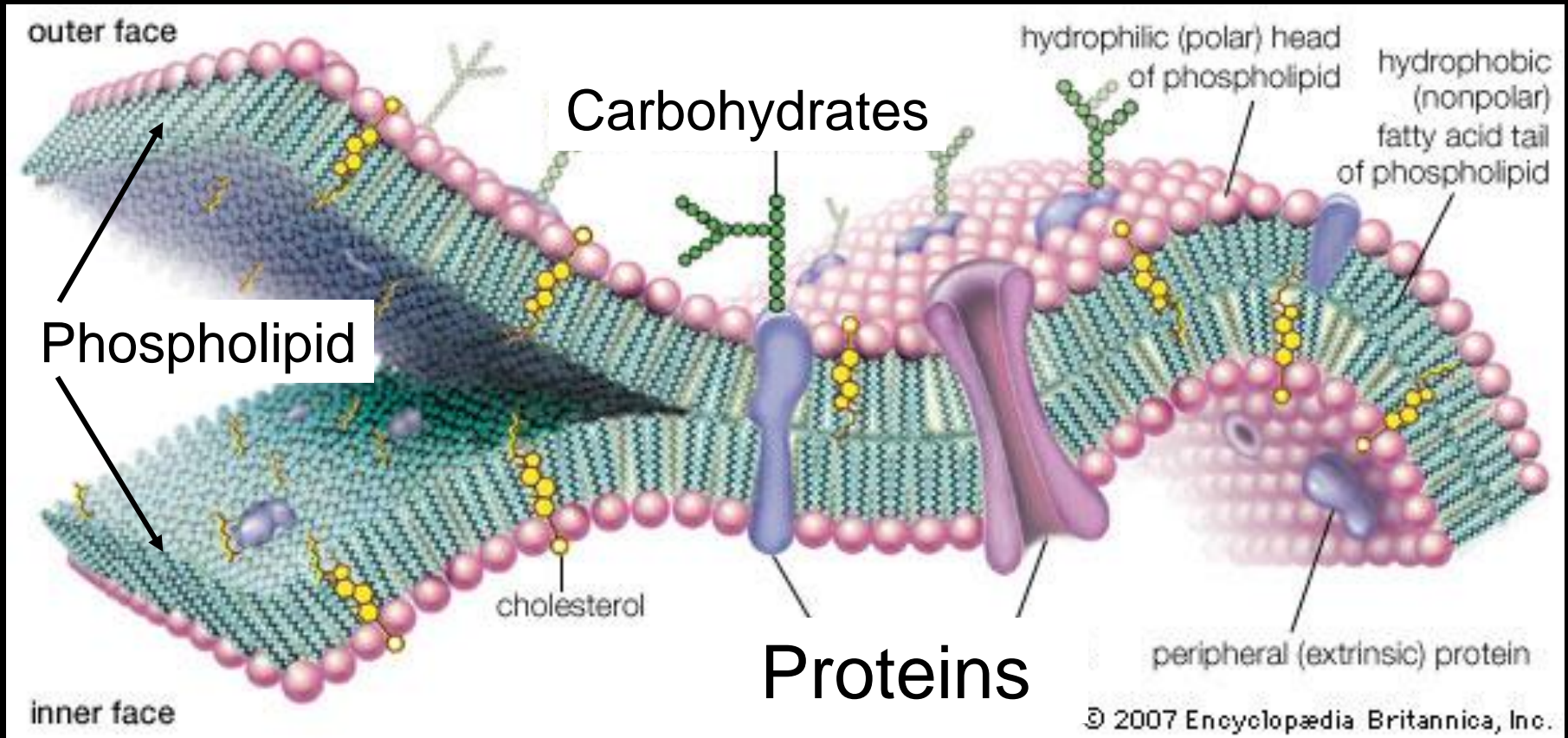
- Identify the major components of the cell membrane
- Describe the Fluid Mosaic Model

Cell Membrane

All cells are surrounded by a thin, flexible barrier known as the cell membrane or plasma membrane

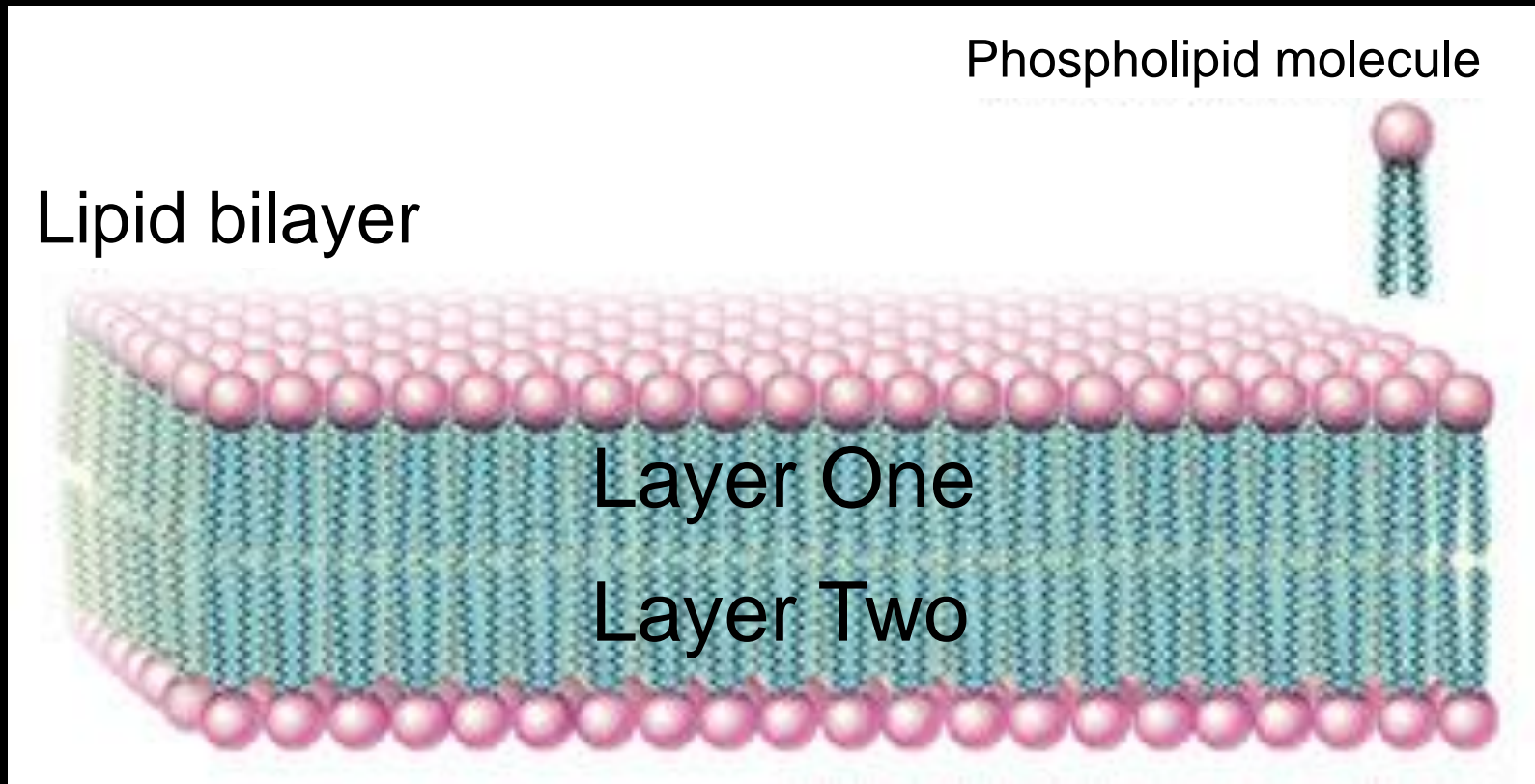


Components of the Cell Membrane



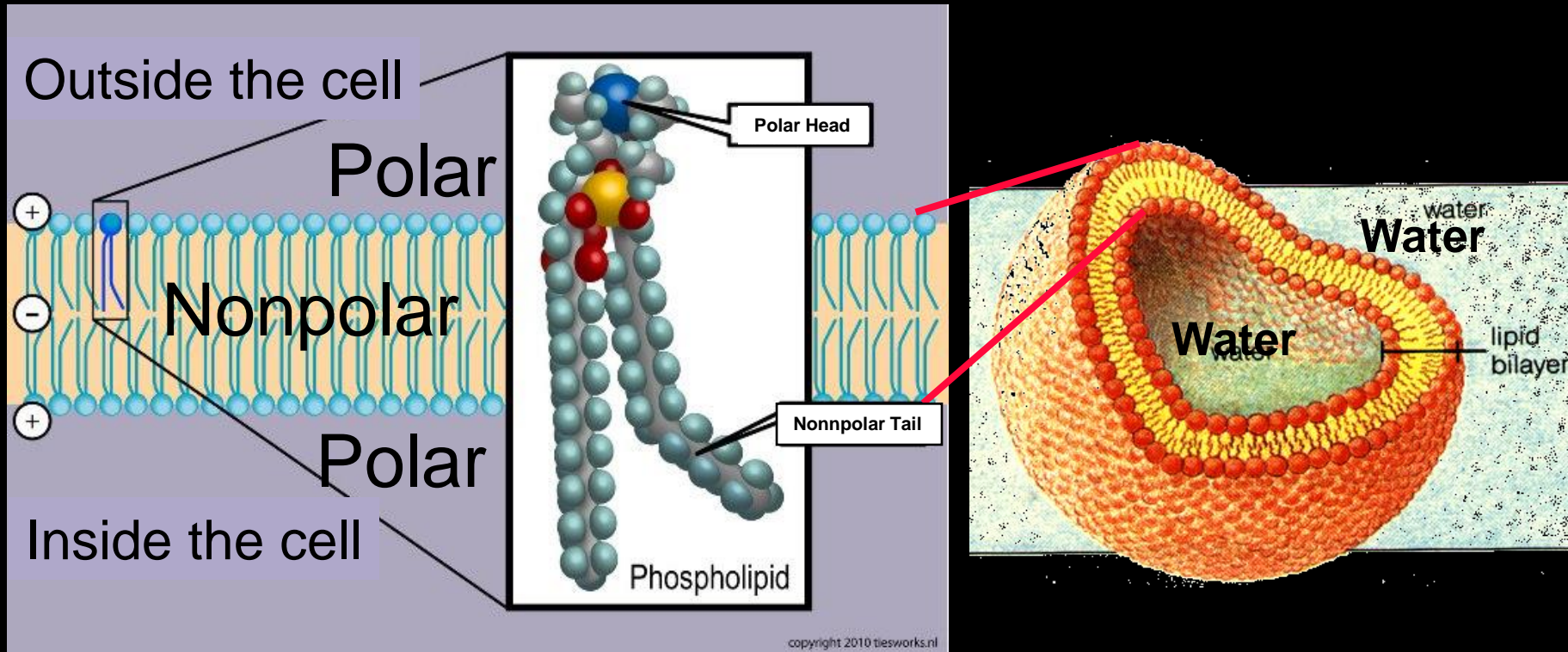
Phospholipids, Proteins, Carbohydrates

Lipid Bilayer



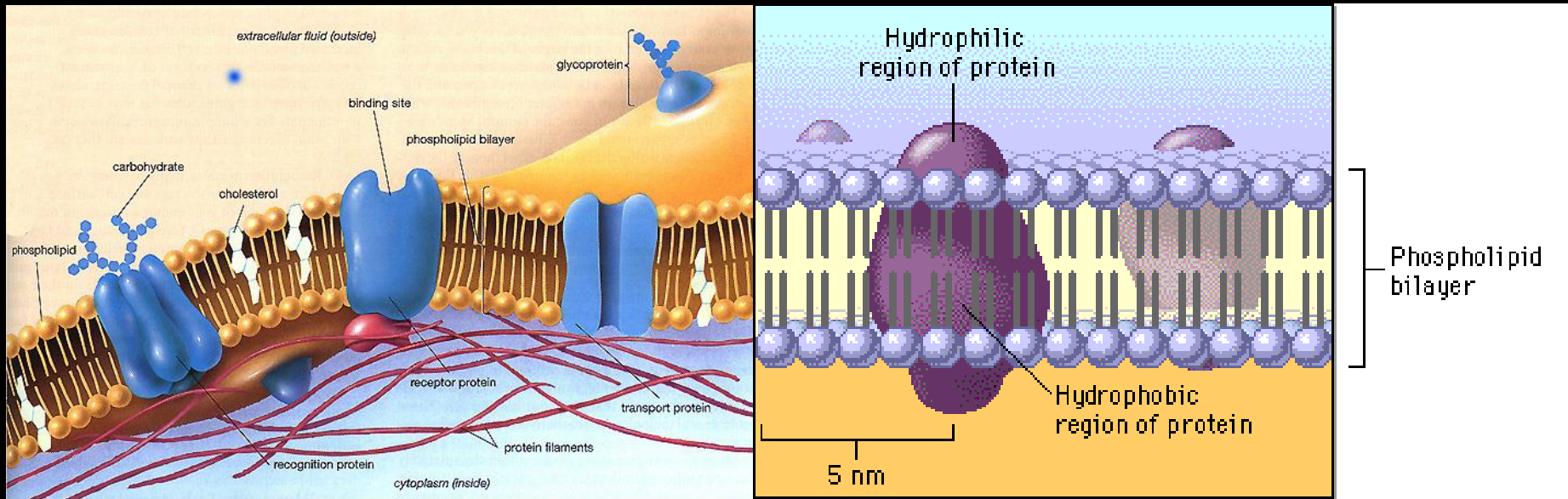
Phospholipids form a lipid bilayer

Phospholipid



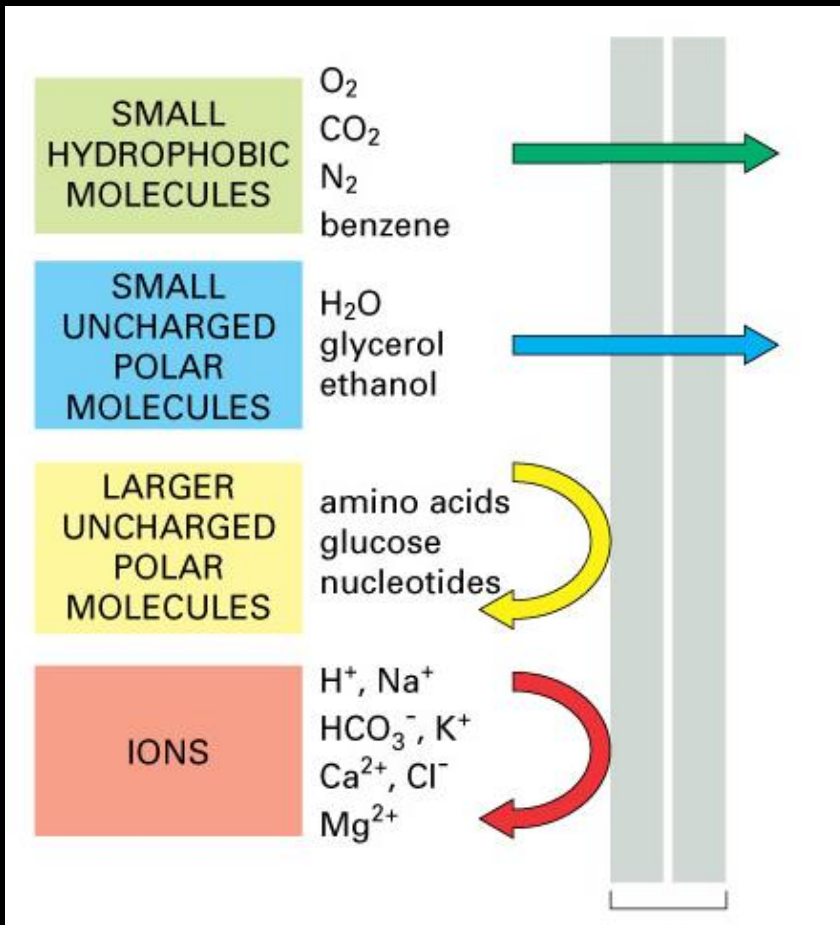
Phospholipids are hydrophilic (polar head) and hydrophobic (nonpolar tail)

Fluid Mosaic Model



The lipid bilayer is fluid like vegetable oil. Proteins and other substances are able to move across the membrane.

Semi Permeable (Selectively Permeable)



Cell Membrane

Some substances are able to move through the membrane, others are not.

YouTube

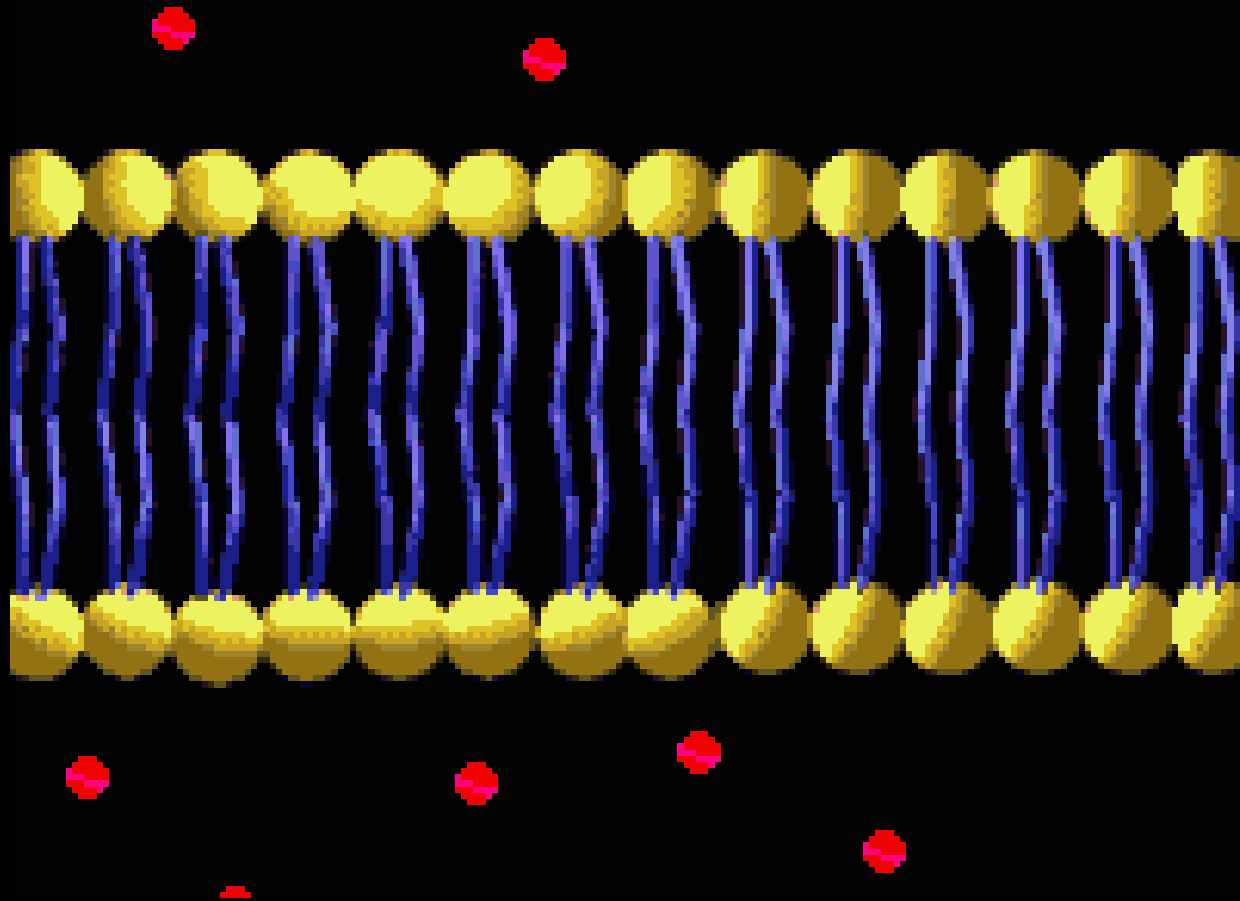
Fluid Mosaic Model

Stop Here



Cell Membrane

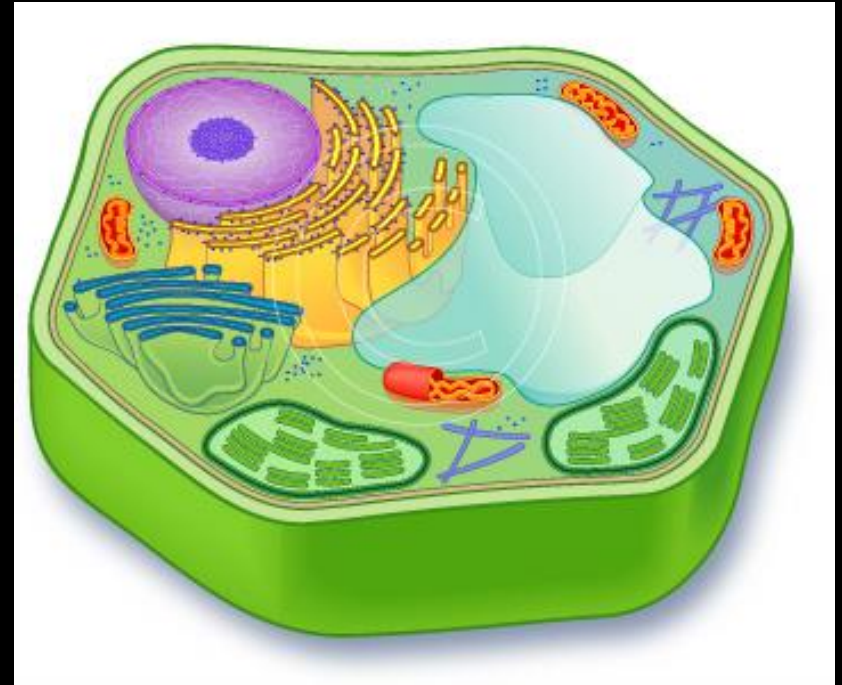
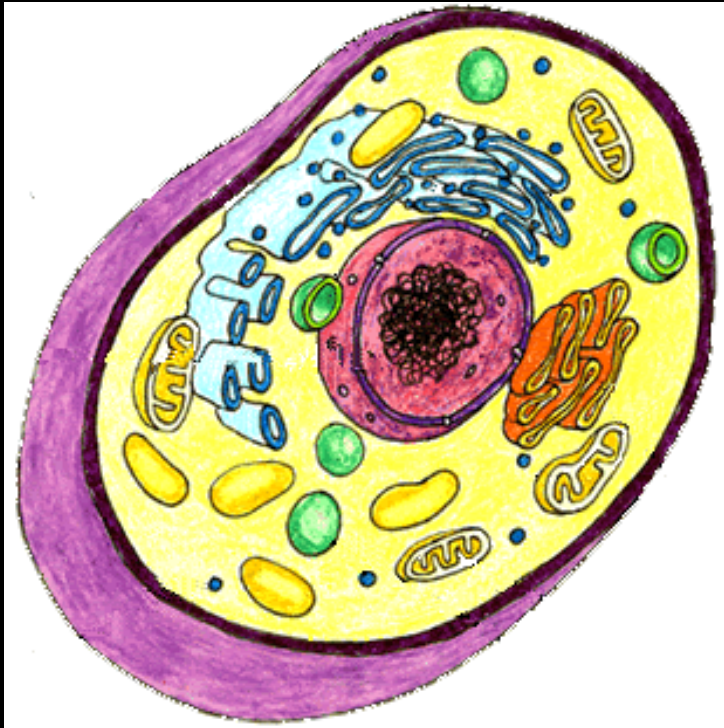
Part 2



Learning Objectives

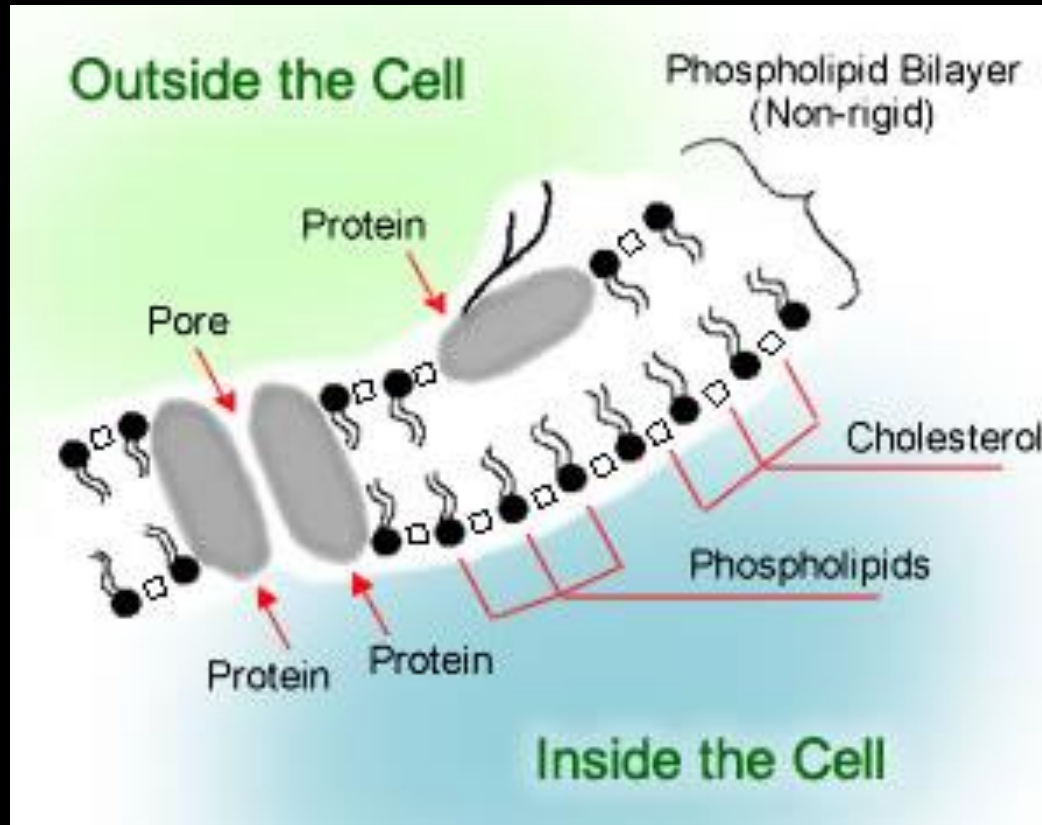
- Describe the main functions of the cell membrane
- Describe the process of diffusion

Function of the Cell Membrane



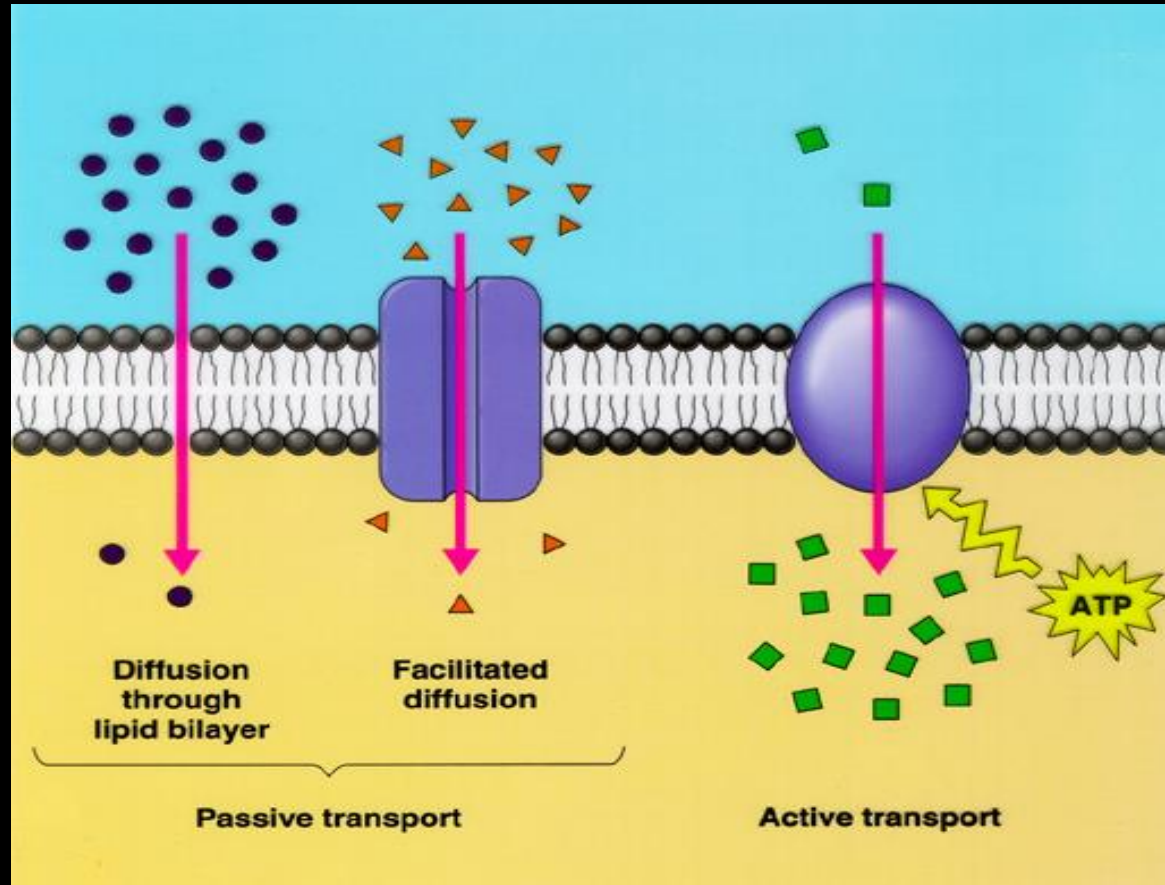
Provides protection and support

Function of the Cell Membrane



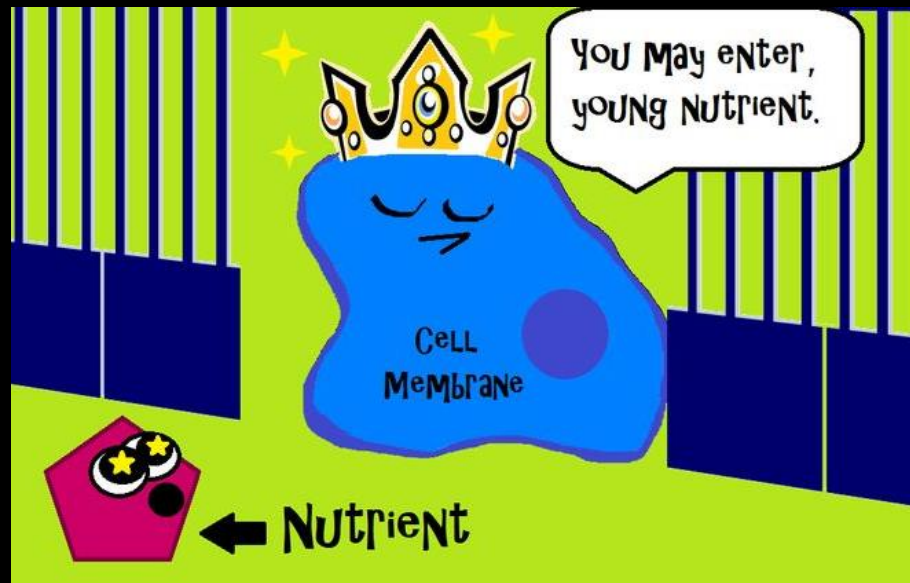
Separates the inside of the cell from the outside

Function of the Cell Membrane



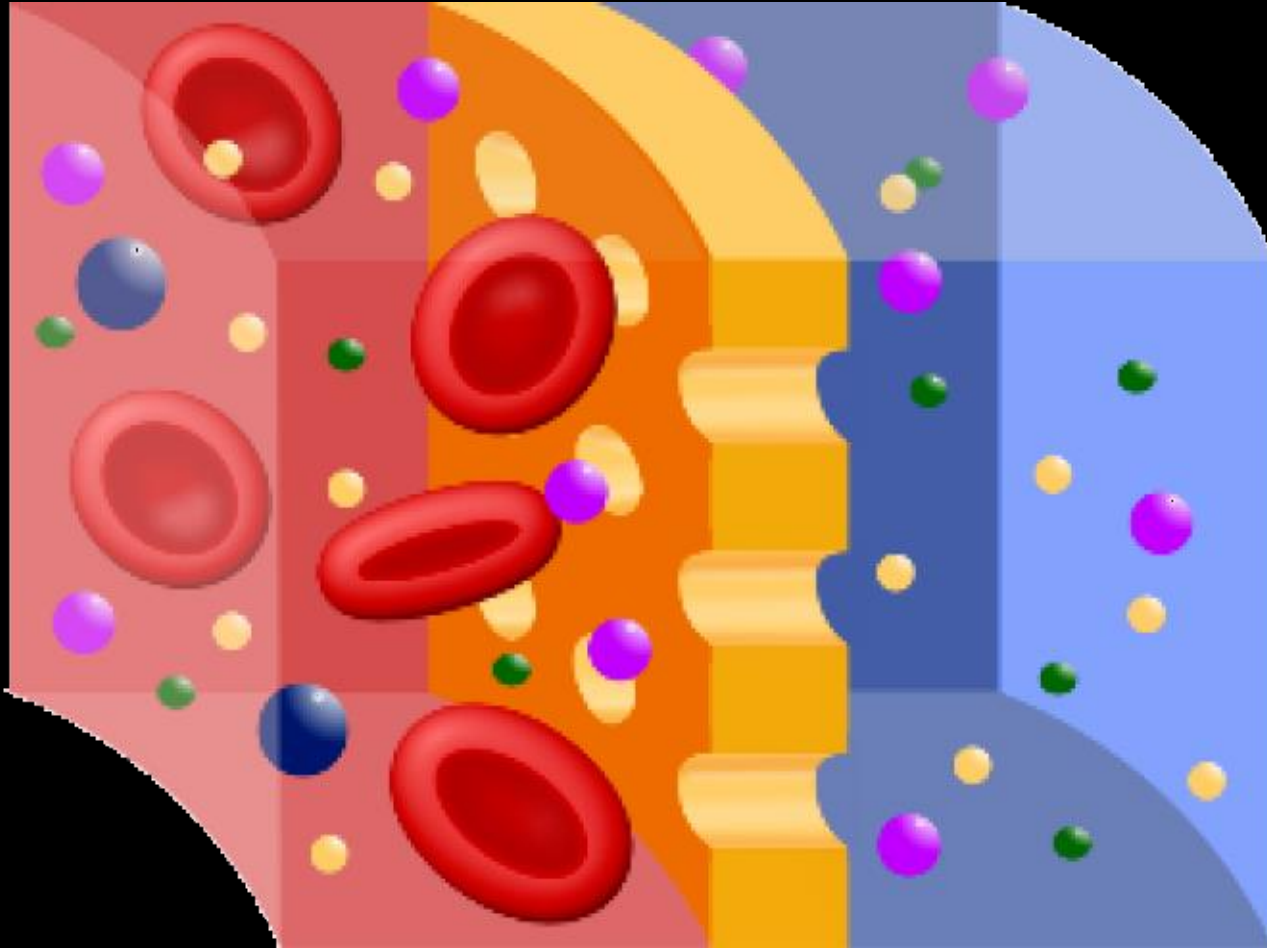
Exchange materials such as food, water, wastes and gases

Function of the Cell Membrane



Regulates what enters and leaves the cell

Function of the Cell Membrane



Help organisms maintain homeostasis.

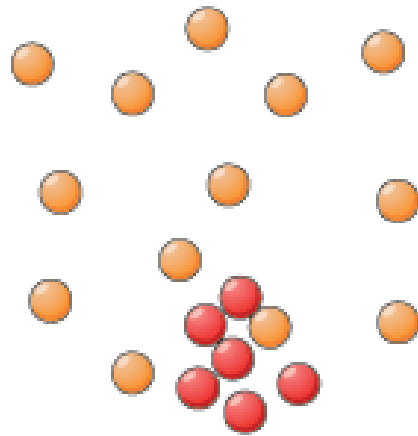
YouTube
Cell Membrane
Ricochet Science

Stop Here

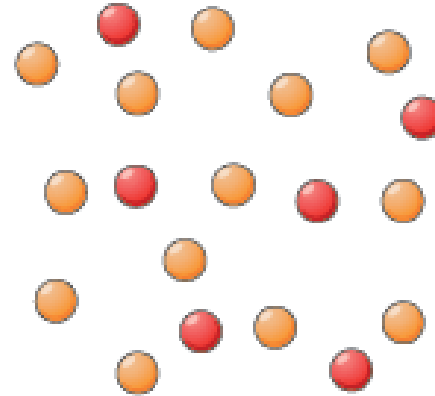


Cell Membrane

Part 3



Before diffusion

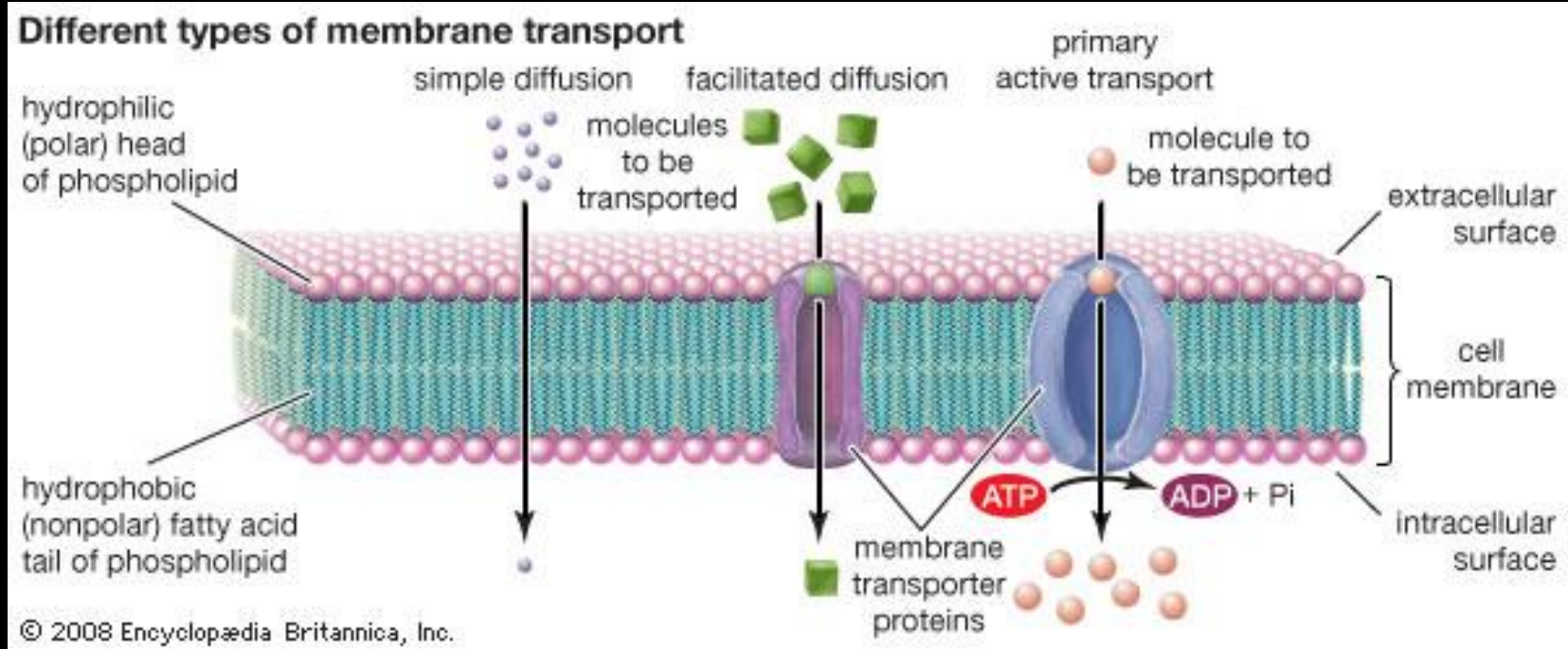


After diffusion

Learning Objectives

- Name the three types of Passive Diffusion
- Describe the process of diffusion

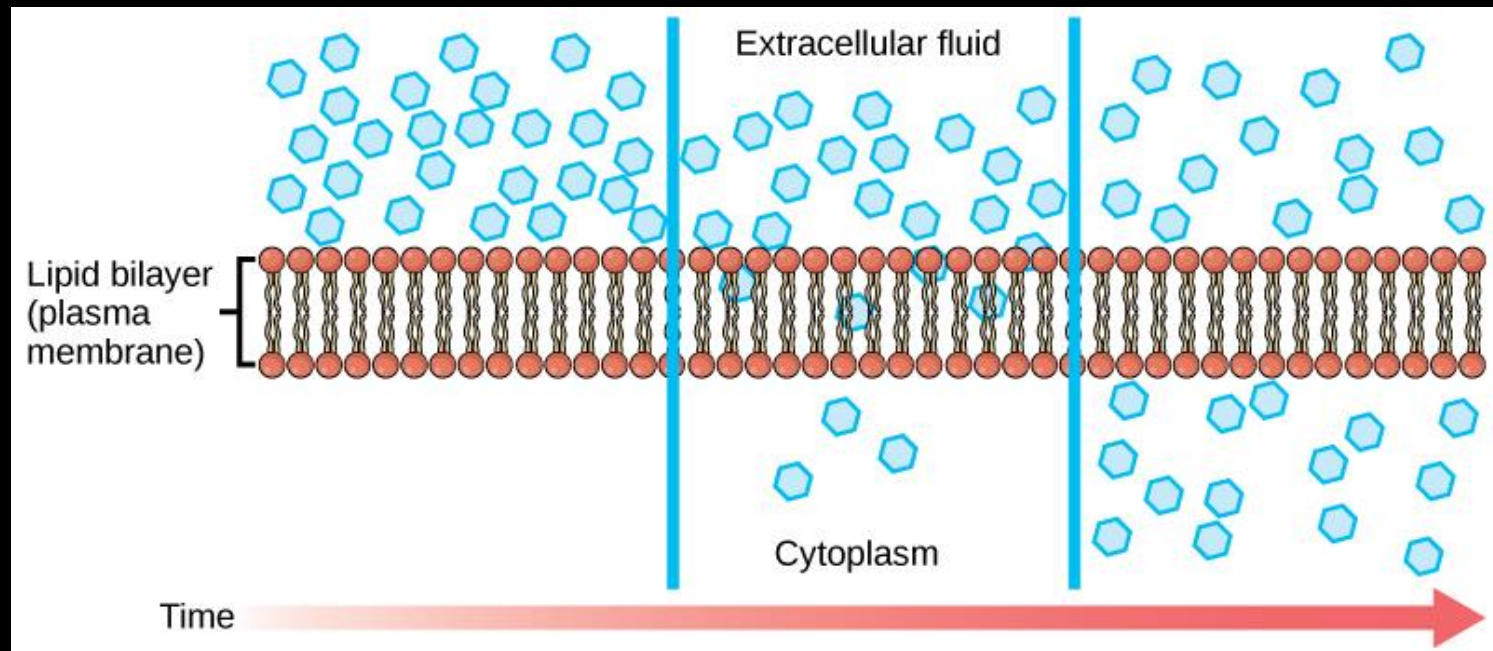
Two Types of Membrane Transport



1. Passive Transport
2. Active Transport

Passive Transport

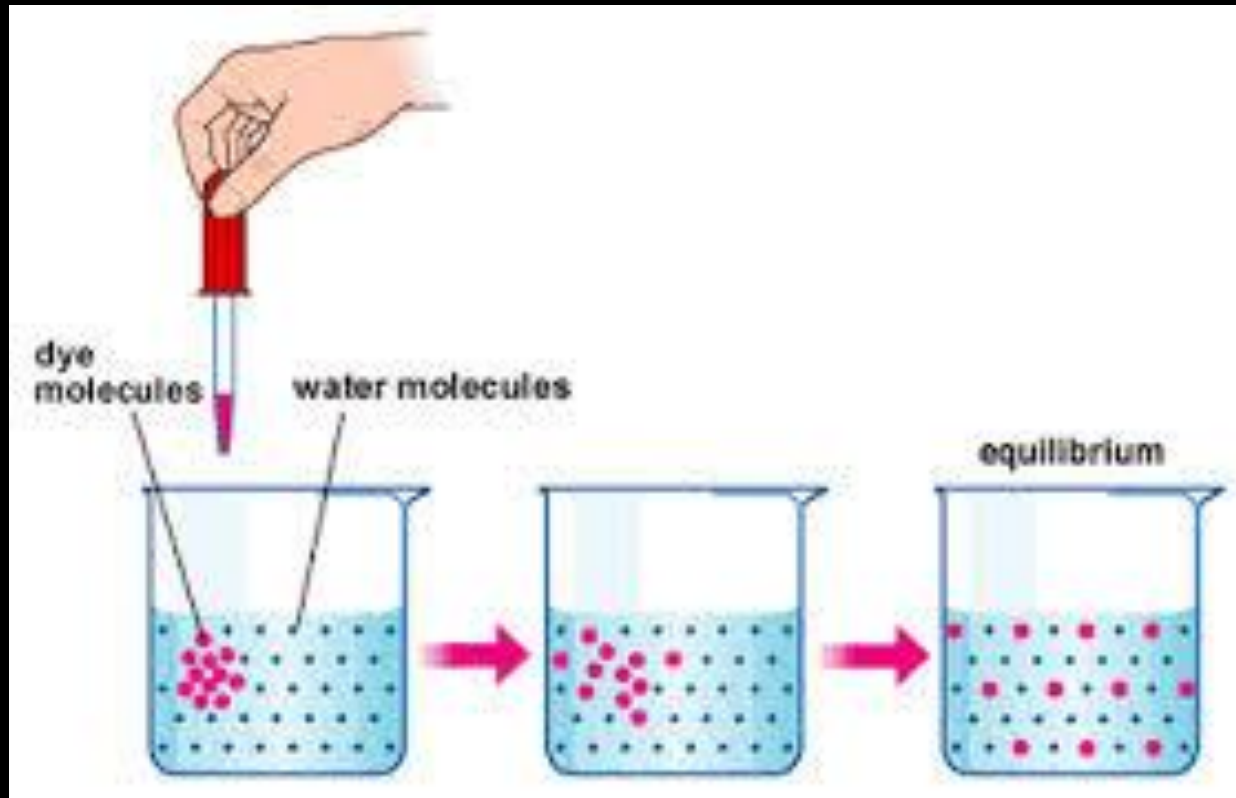
Movement of substances across the cell membrane without any input of energy (ATP) by the cell.



3 Types of Passive Transport

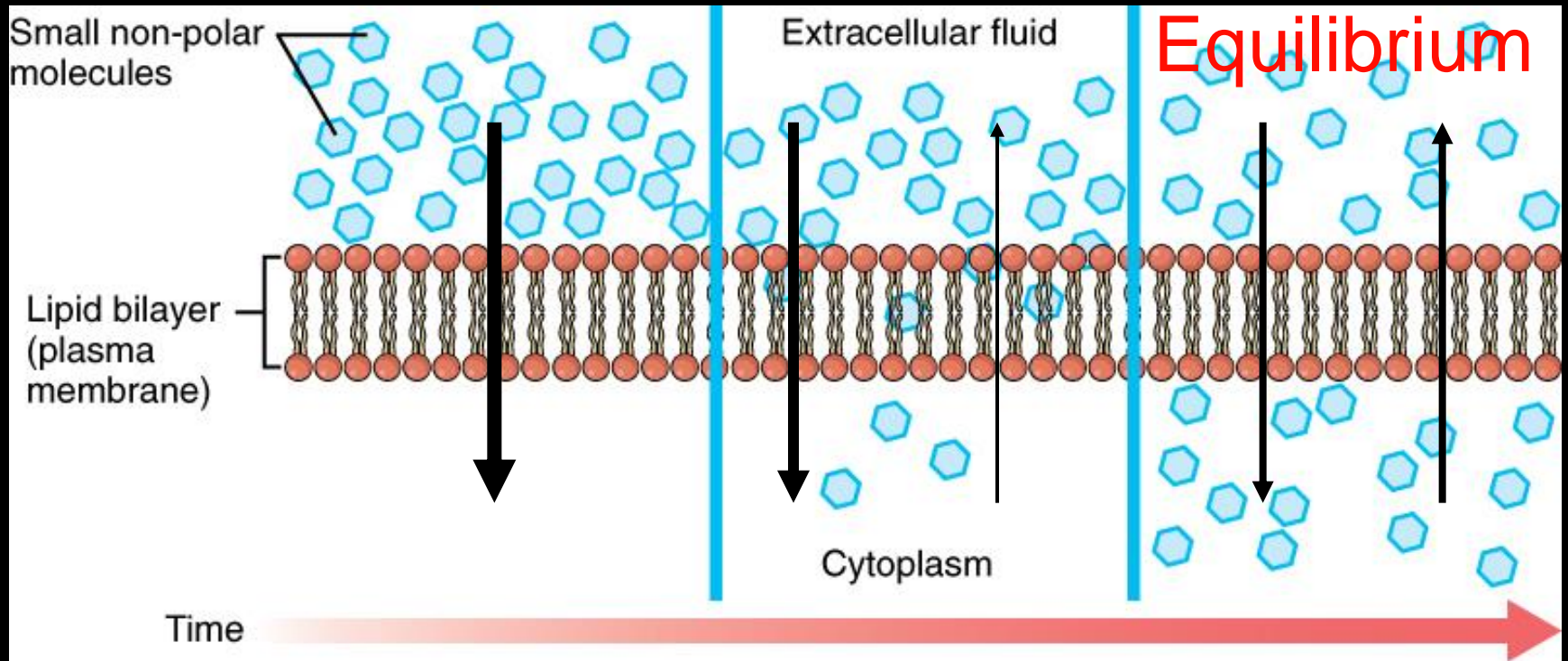
1. Diffusion
2. Osmosis
3. Facilitated Diffusion

Diffusion



Molecules move from an area of high concentration to an area of low concentration.
(with the concentration gradient)

Equilibrium

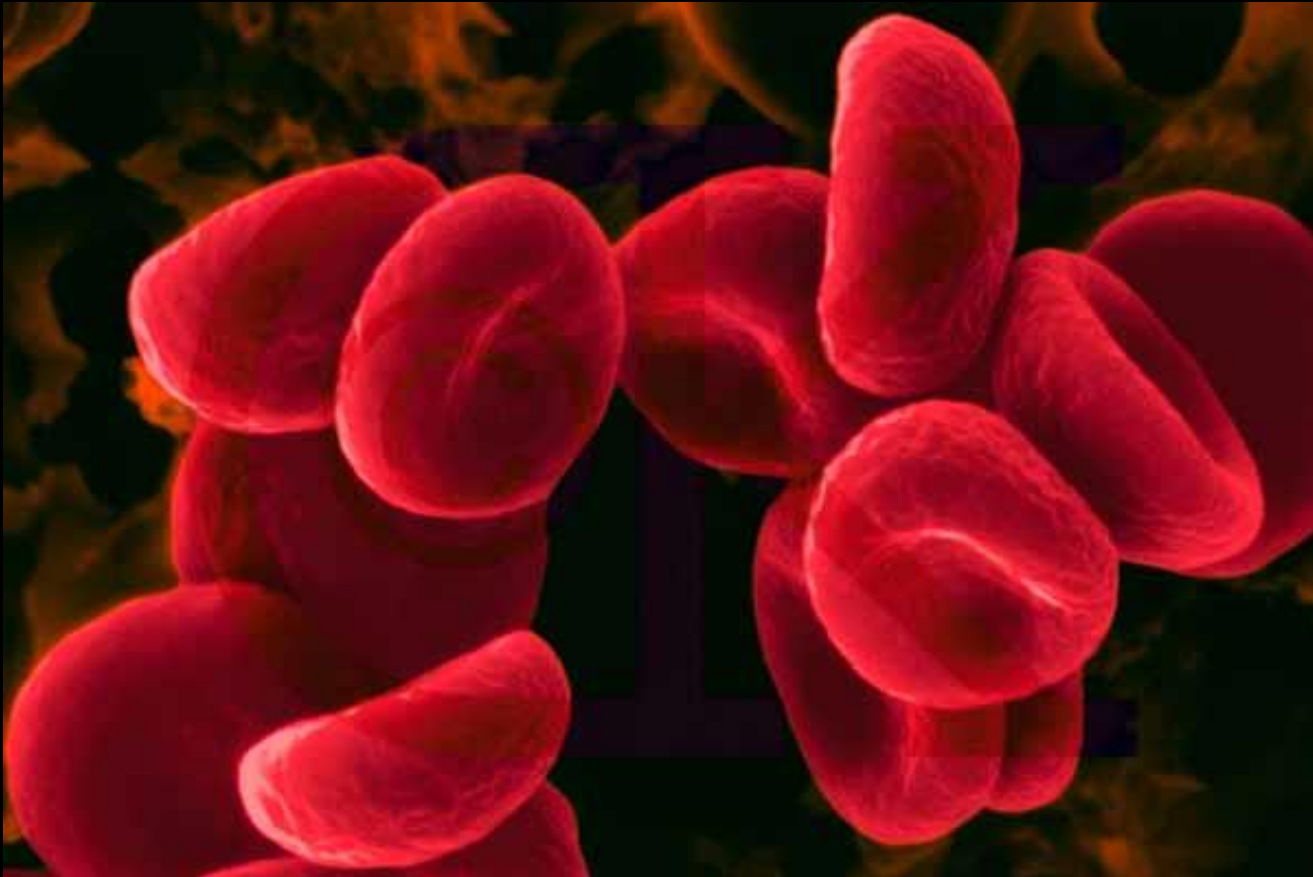


Molecules spread out evenly until equal amounts of molecules are moving in both directions

YouTube
Simple Diffusion

Cell Membrane

Part 4



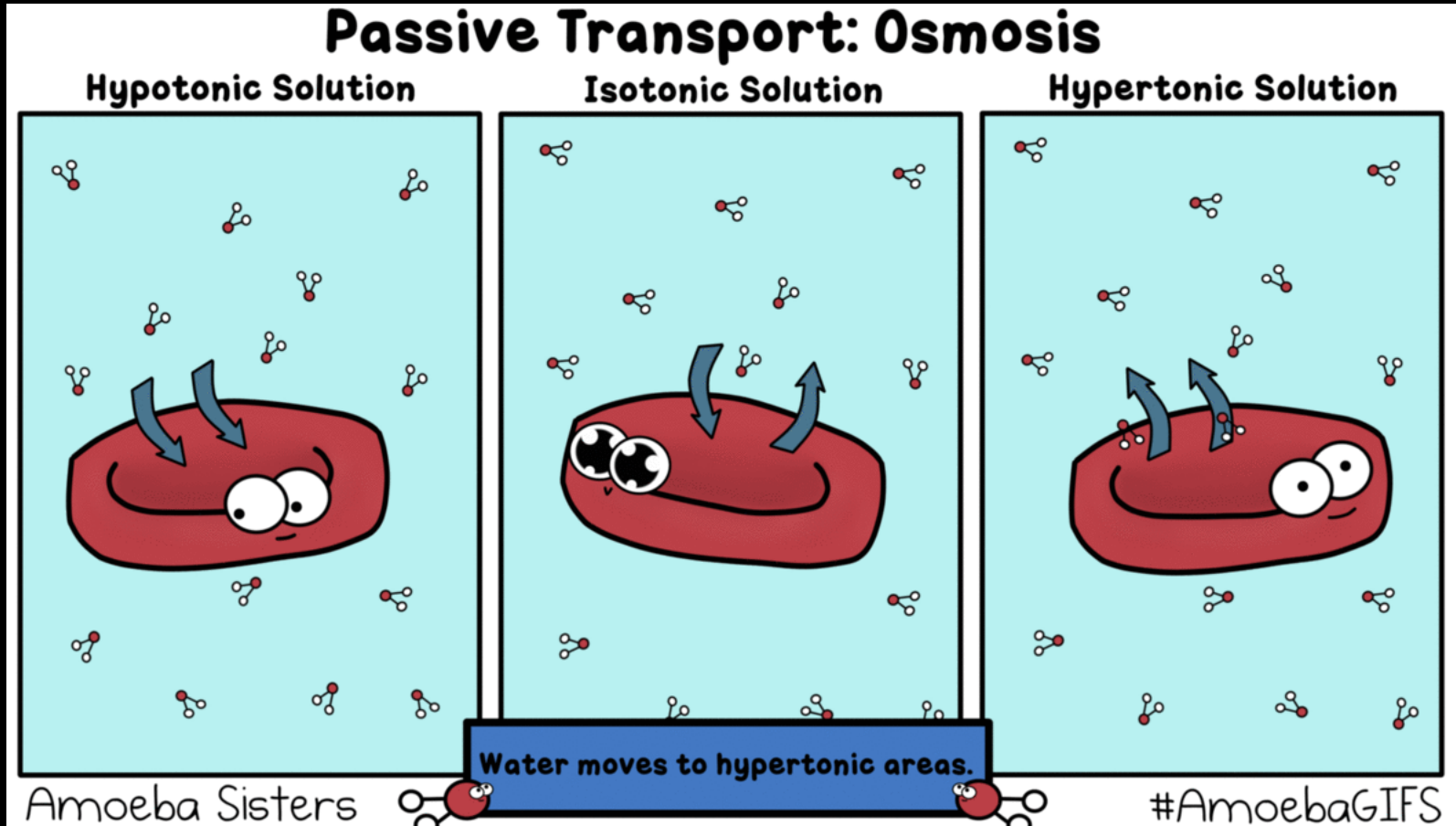
Learning Objectives

- Describe the effects of hypertonic, isotonic and hypotonic environments on plant and animal cells

3 Types of Passive Transport

1. Diffusion
2. Osmosis
3. Facilitated Diffusion

Osmosis

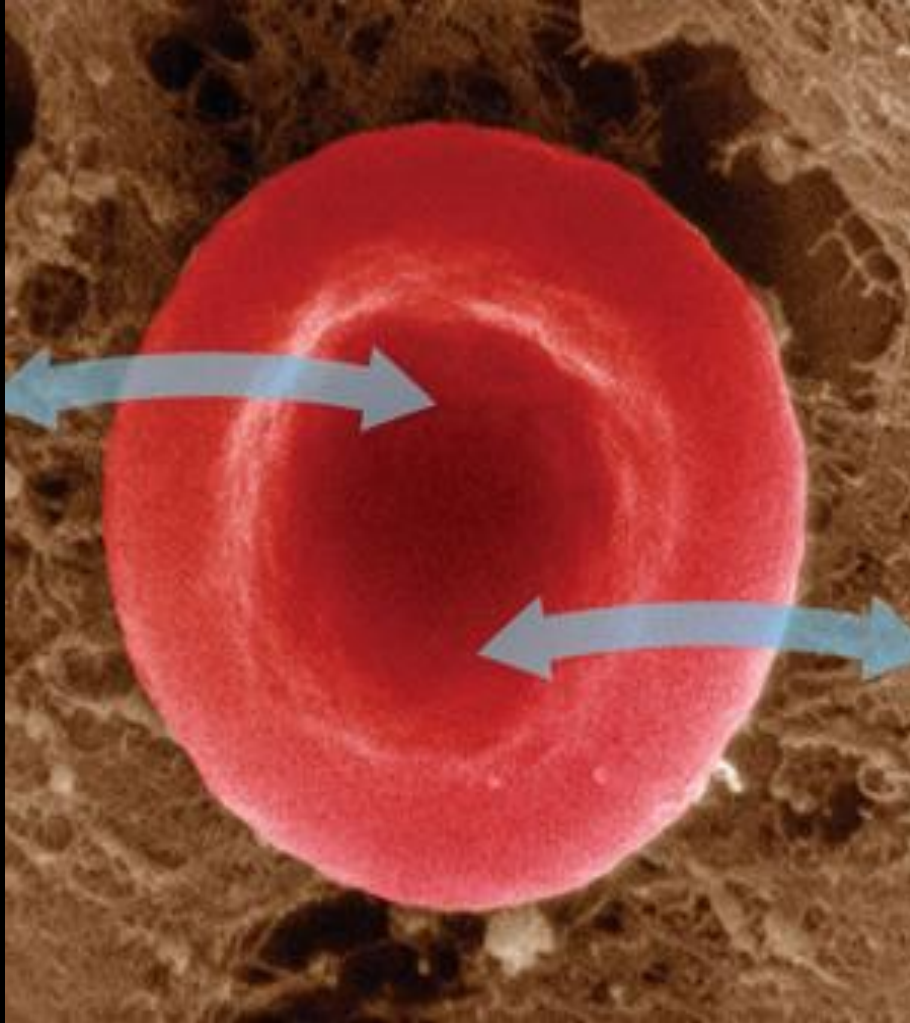


Osmosis - movement of water molecules across a membrane

YouTube
Amoeba Sisters
Osmosis

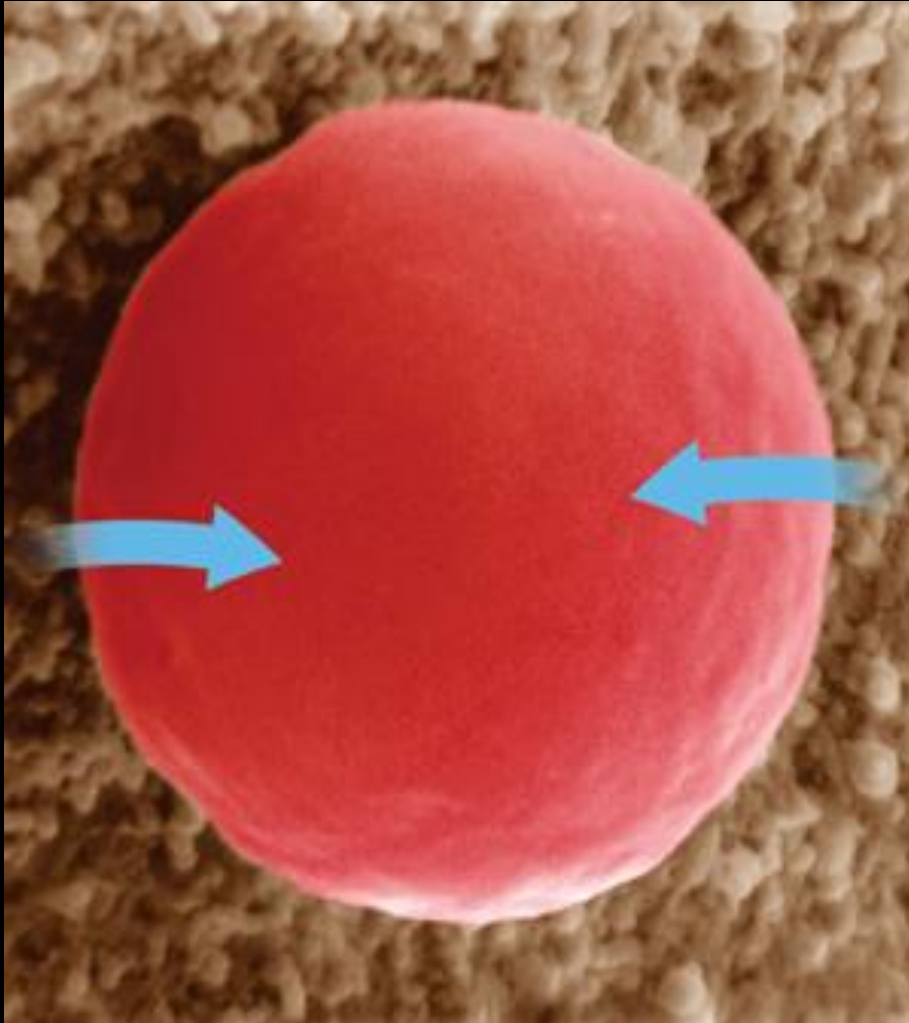
Isotonic Solution

(Red Blood Cell)



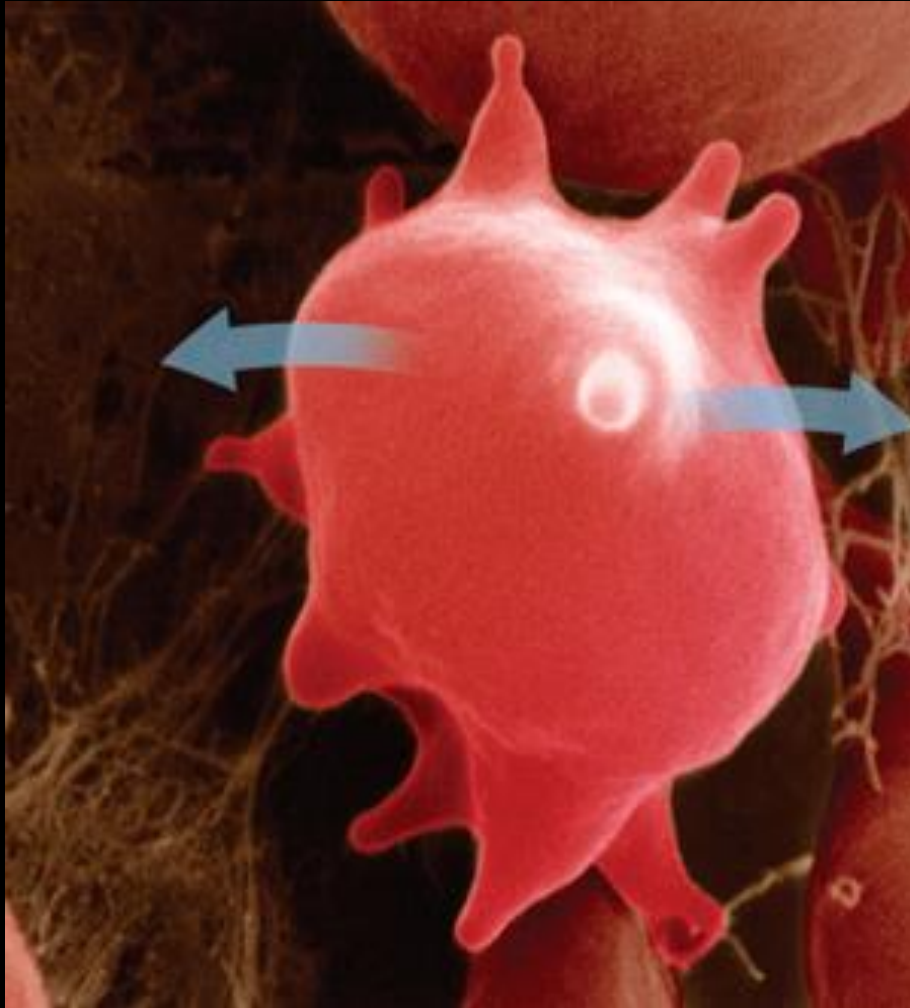
- The solution and the cell have the same amount of solutes.
- Equal amounts of water enter and exit the cell so its size stays constant.

Hypotonic Solution (Red Blood Cell)



- The solution has fewer solutes than inside the cell.
- More water enters the cell causing the cell to expand and burst.

Hypertonic Solution (Red Blood Cell)



- The solution has more solutes than the cell.
- More water exits the cell causing the cell to shrivel and even die.

Summary

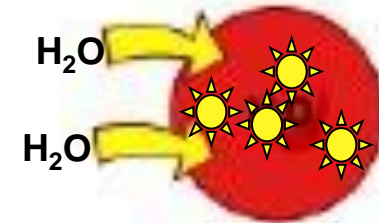
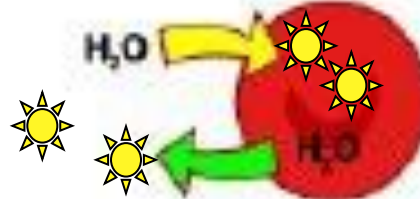
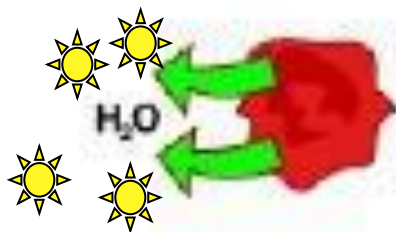
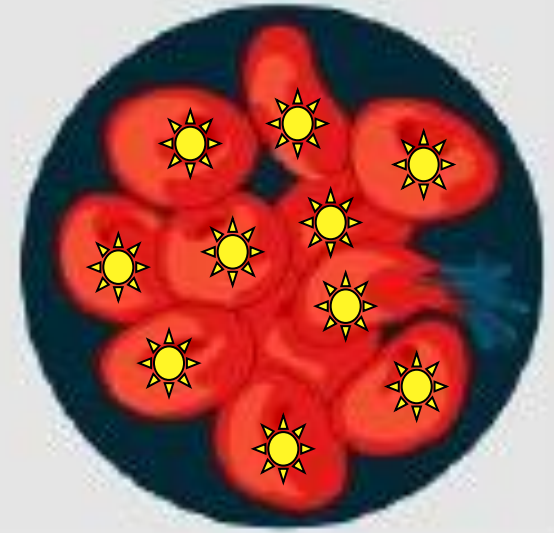
Hypertonic



Isotonic



Hypotonic

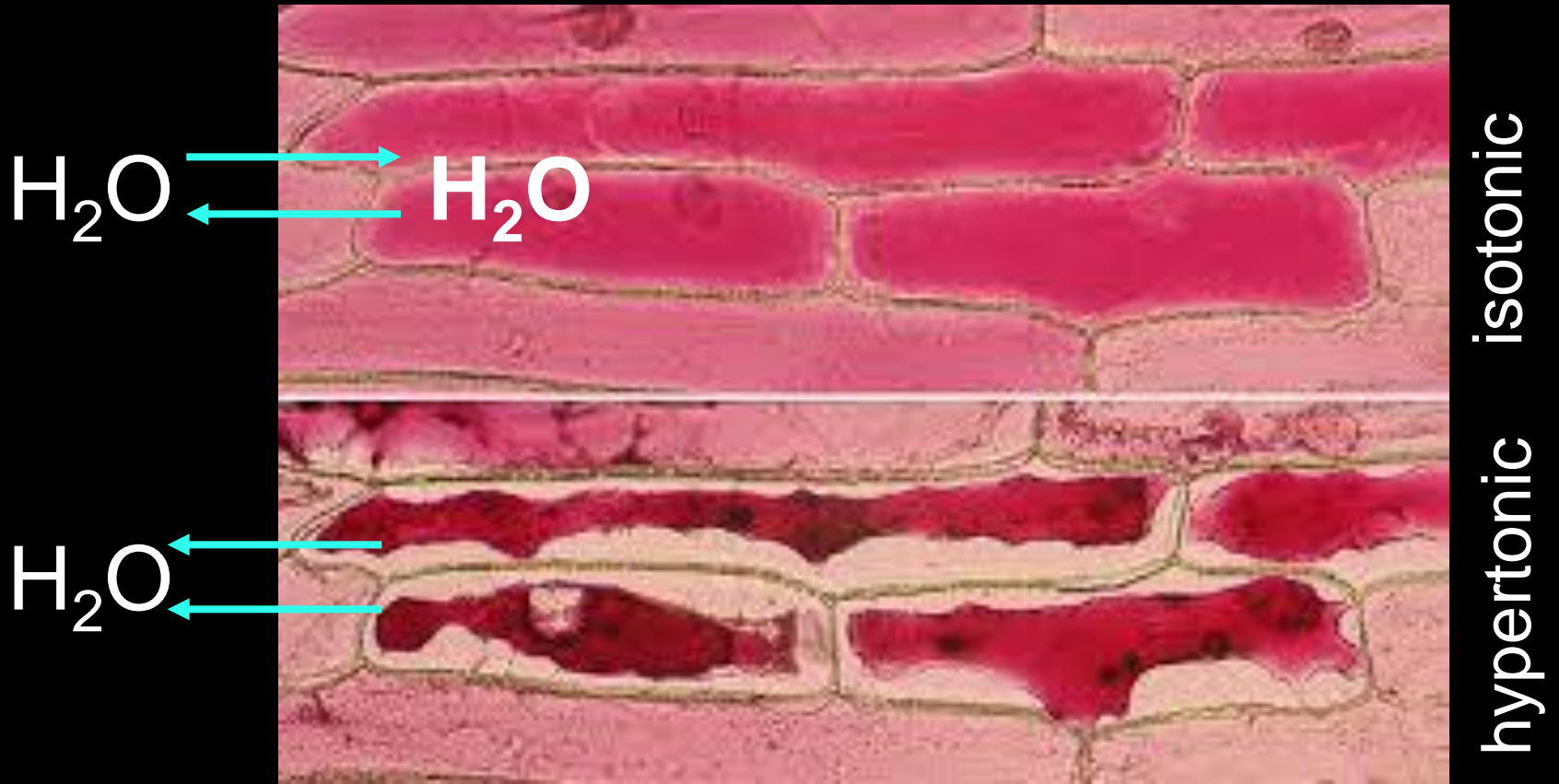


More “stuff” outside the cell. Water moves out of cell.

Same amount of “stuff” inside and outside the cell.

More “stuff” inside the cell. Water moves into cell.

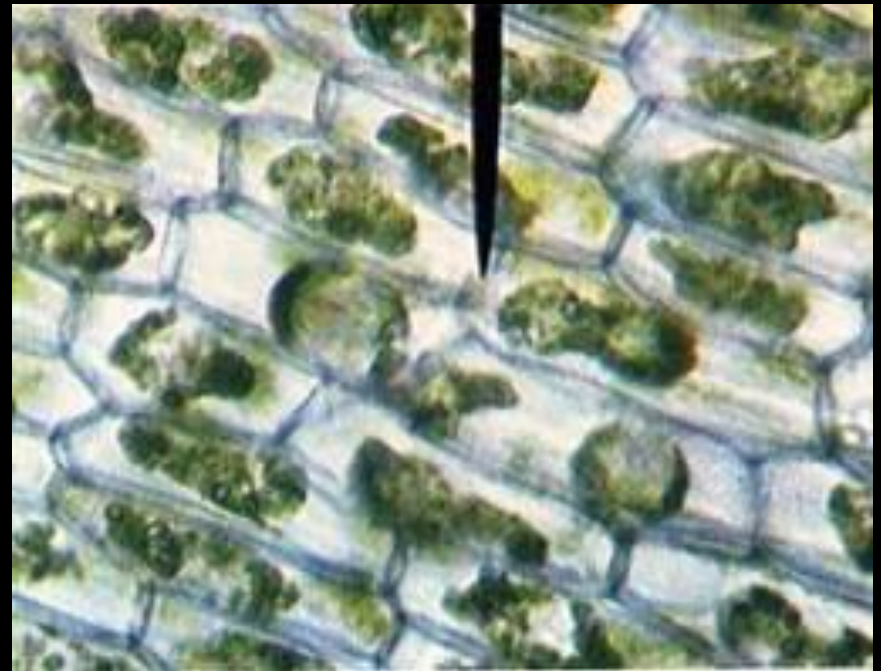
Plasmolysis



Plasmolysis - in plants, the cytoplasm pulls away from the cell wall due to the loss of water through osmosis.

Plasmolysis

- Cells shrink when turgor pressure is lost.
- Plasmolysis is the reason why plants wilt.



YouTube

Egg

Hypotonic/Hypertonic

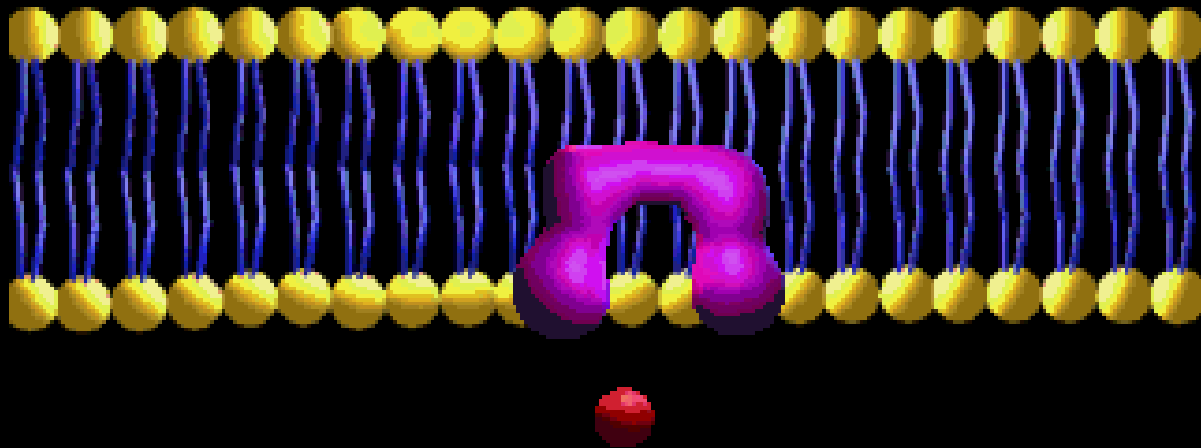
Video

Stop Here



Cell Membrane

Part 5



Learning Objectives

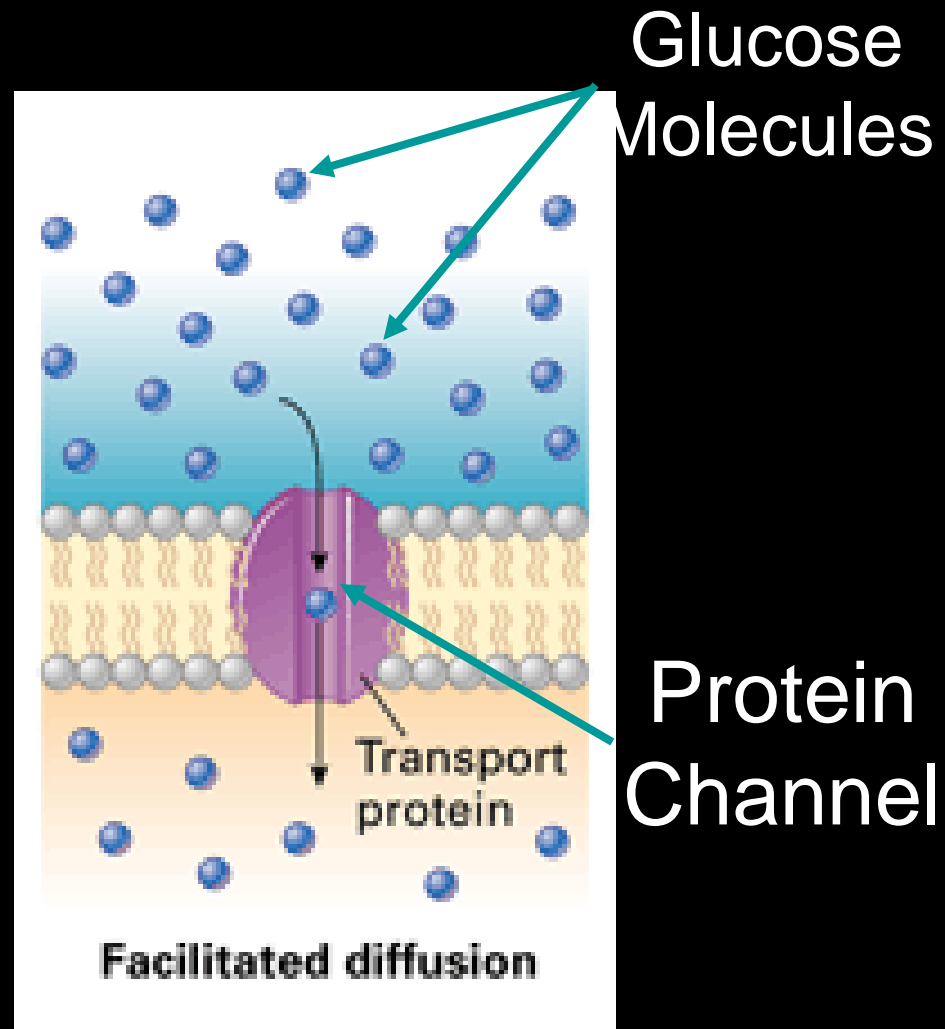
- Describe the process of facilitated diffusion
- Describe the process of active transport

3 Types of Passive Transport

1. Diffusion
2. Osmosis
3. Facilitated Diffusion

Facilitated Diffusion

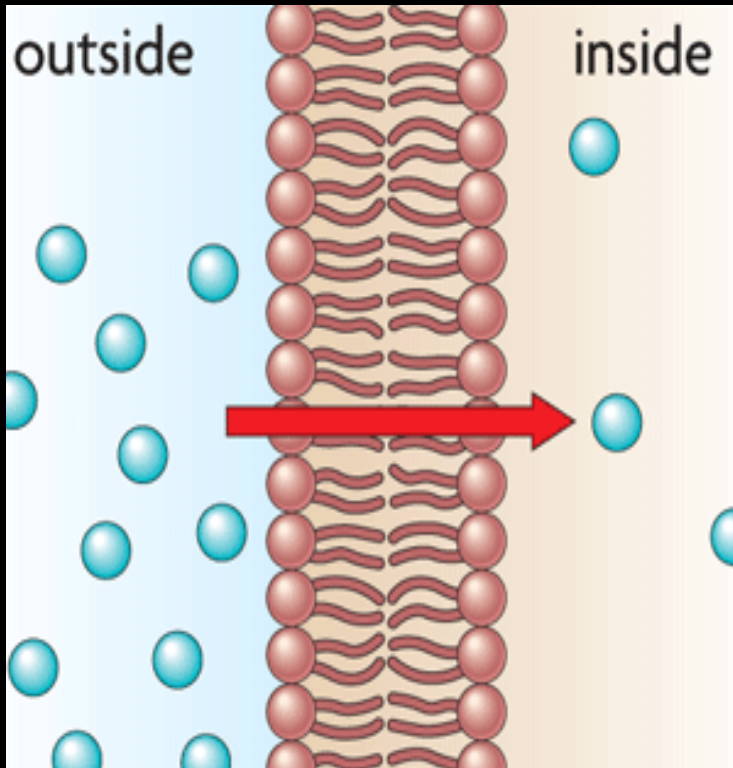
- The movement of specific molecules across the cell membrane through protein channels.
- High concentration to low concentration. (with the concentration gradient)



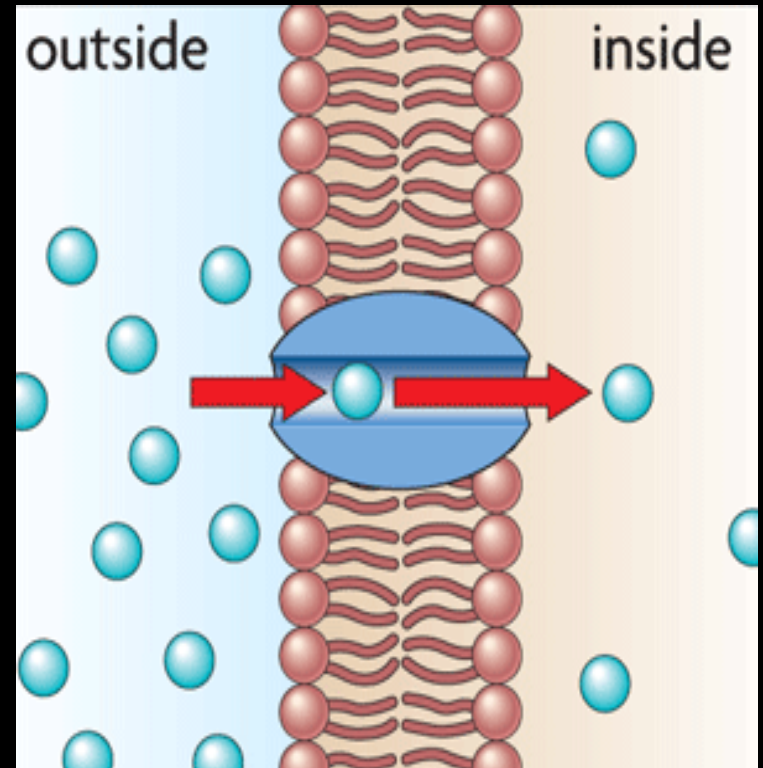
Diffusion

vs.

Facilitated Diffusion



Diffusion

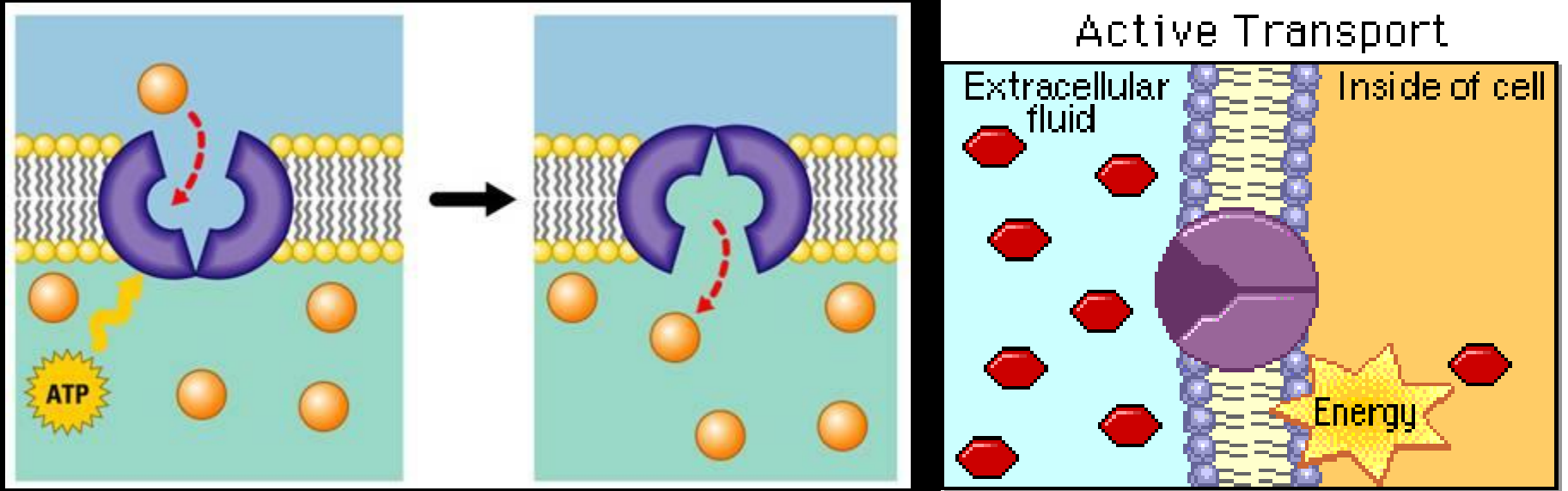


Facilitated Diffusion

3 Types of Active Transport

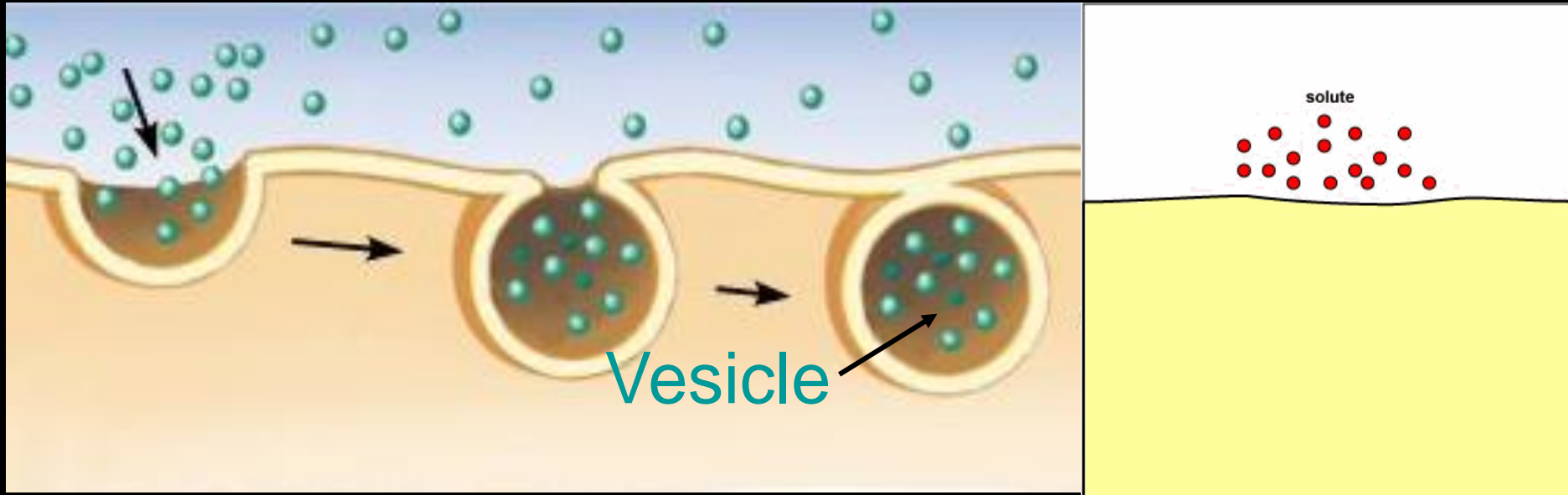
1. Protein and ion pumps
2. Endocytosis
3. Exocytosis

Protein Pump



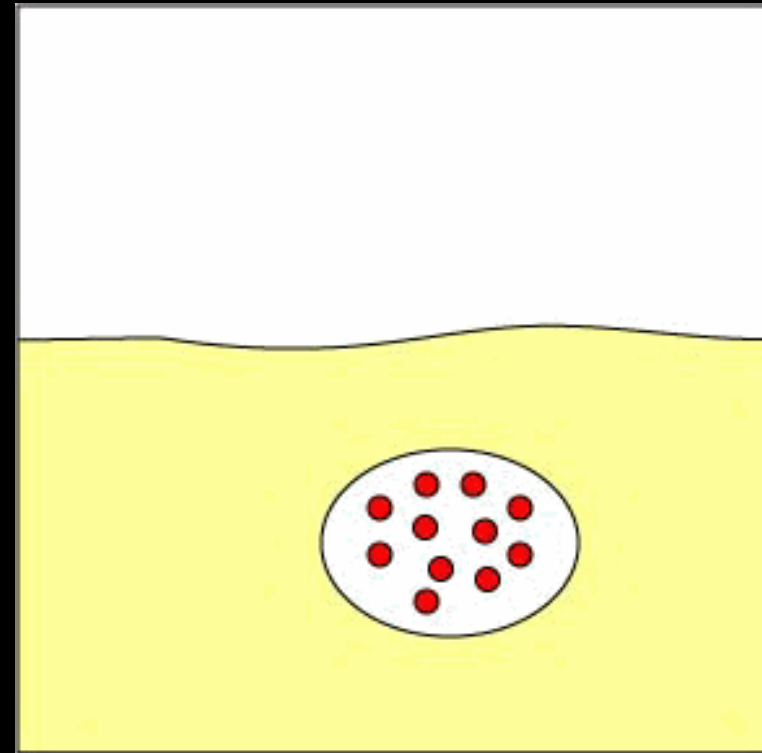
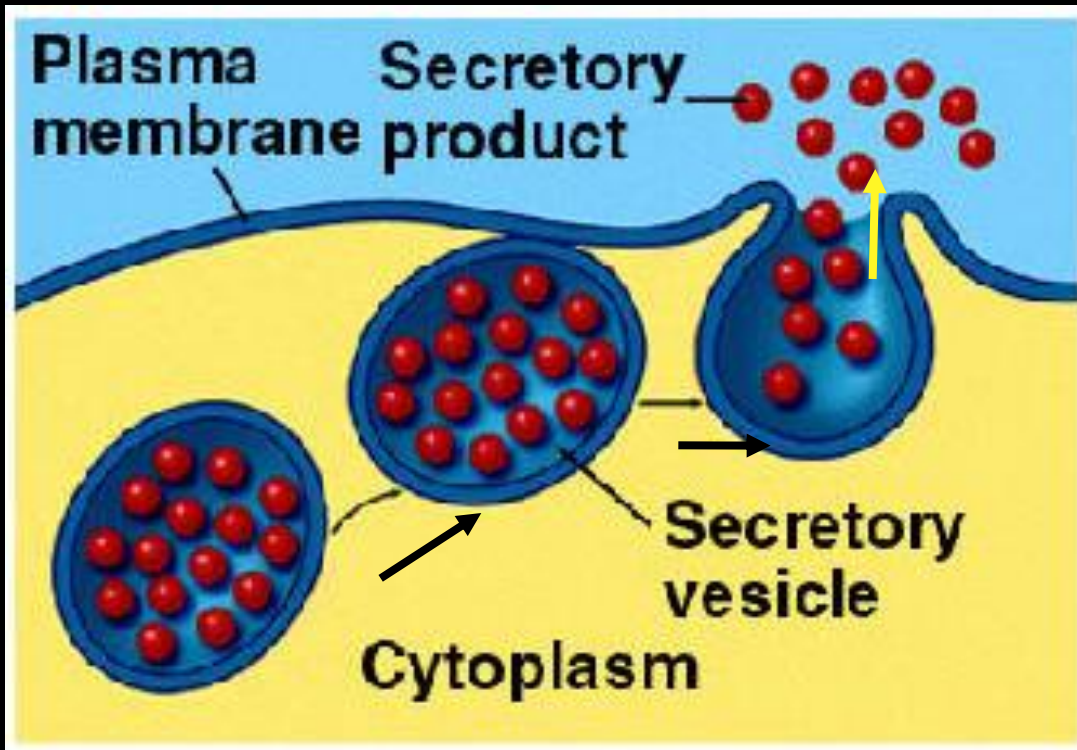
- Proteins embedded in the cell membrane
- Molecules move across the membrane from low to high concentration (against the concentration gradient)
- Requires energy (ATP)

Endocytosis



- Taking material into the cell via vesicles.
- Two types: Pinocytosis - “cell drinking”
Phagocytosis - “cell eating”

Exocytosis



- Materials released from inside to outside of the cell.
- Reverse of endocytosis.

YouTube

Amoeba Sisters

Cell Transport

YouTube

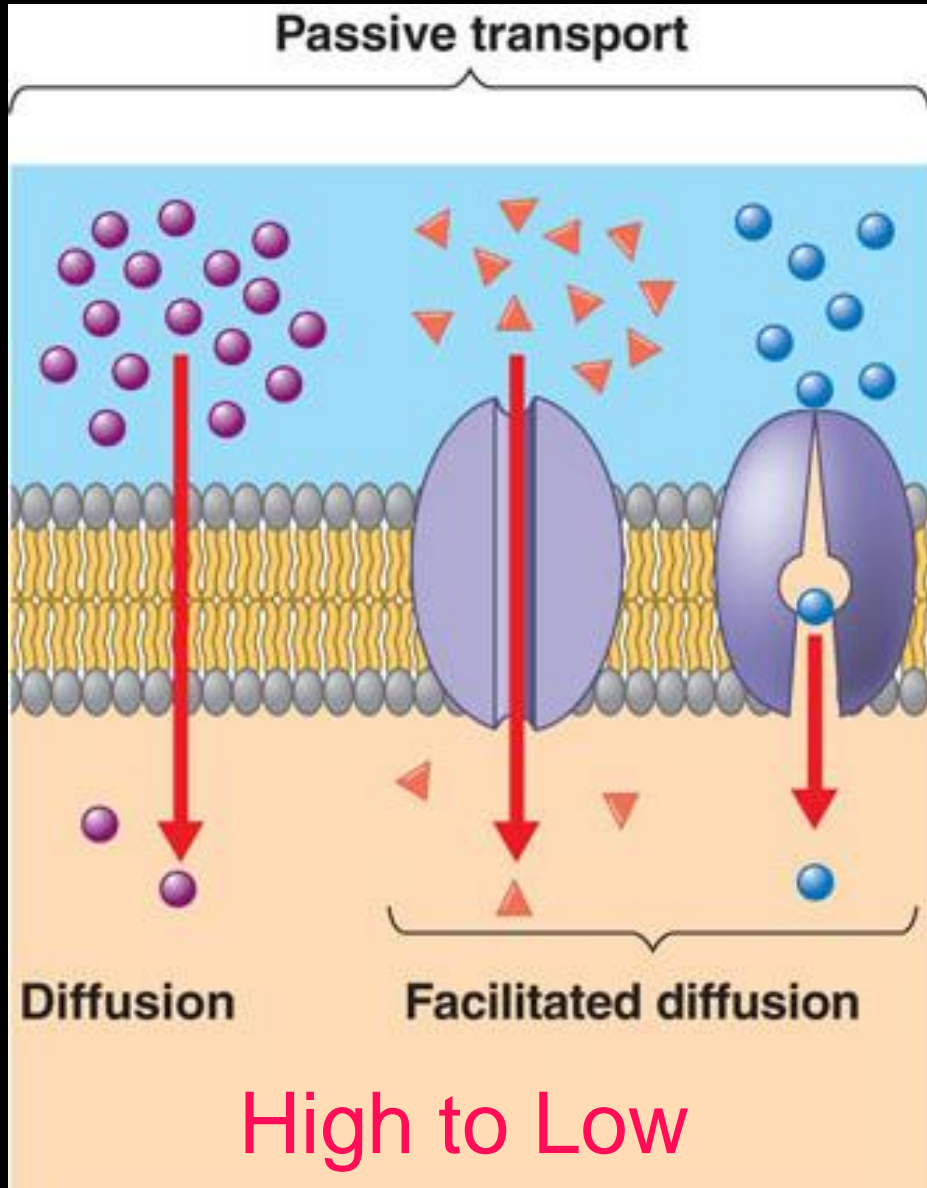
Endocytosis vs. Exocytosis

YouTube

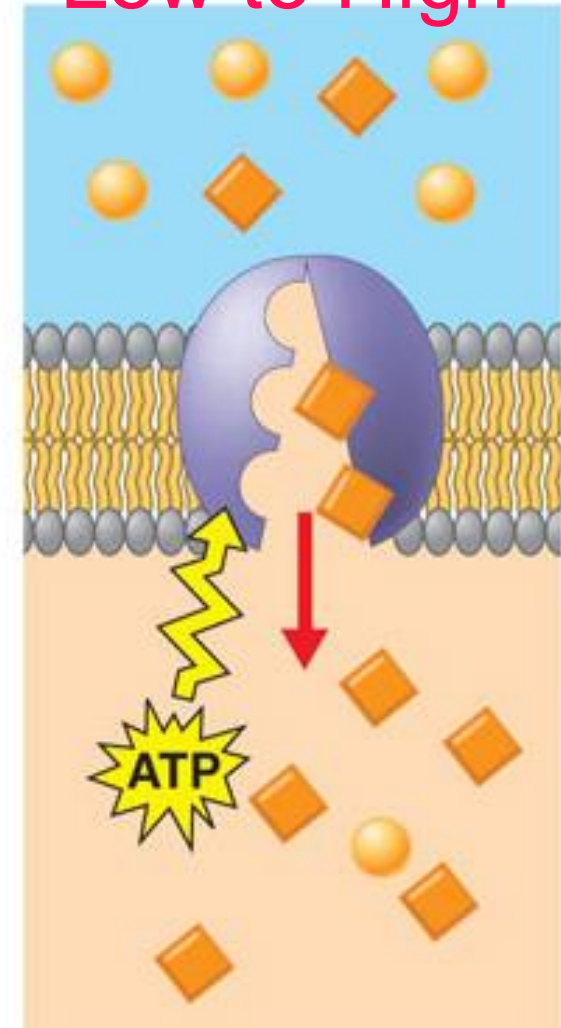
Membrane Transport
Animation

Passive vs. Active Transport

No Energy Required



Low to High



Energy Required

Stop Here



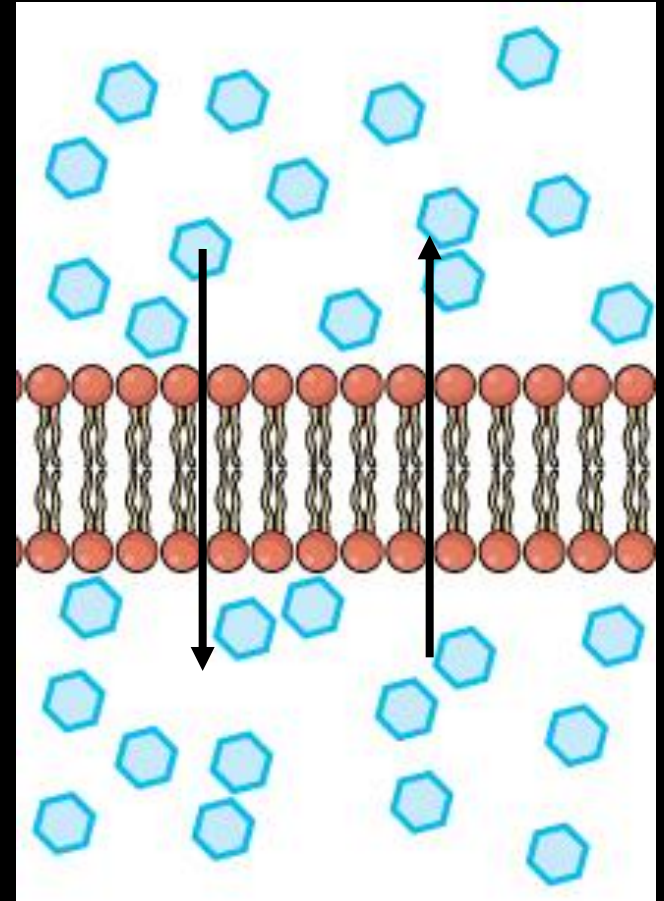
Types of Solutions

(compared to a cell)

- Isotonic solution: same concentration of water and solute.
- Hypotonic solution: lower concentration of solute, a lot of water.
- Hypertonic solution: higher concentration of solute, less water.

Equilibrium

- The solute is evenly distributed
- Solute particles diffuse across the membrane in both directions



Cell Boundaries

- All cells are surrounded by a thin, flexible barrier known as the cell membrane, aka plasma membrane.
- Many cells produce a strong supporting layer around the membrane known as the cell wall.